

**OBSERVATIONS ON *PARNASSIA GRANDIFOLIA* DC.
(SAXIFRAGACEAE) IN THE WEST GULF COASTAL PLAIN**

Michael H. MacRoberts and Barbara R. MacRoberts

Bog Research
Shreveport LA 71104
and
Herbarium, Museum of Life Sciences
Louisiana State University in Shreveport
Shreveport LA 71115

Lynn Stacey Jackson

U.S.D.A. Forest Service
Kisatchie National Forest
Winn Ranger District
Winnfield LA 71483

ABSTRACT

We surveyed for and monitored *Parnassia grandifolia*, a West Gulf Coastal Plain rare and imperiled species with a disjunct distribution.

KEY WORDS: *Parnassia grandifolia*, pitcher plant bog, Louisiana, floristics.

INTRODUCTION

Parnassia grandifolia, a southeastern obligate wetland endemic, is of interest because it is globally rare and a disjunct species raising the biogeographical question as to whether extant populations are relicts from a once continuous distribution or are recent long distance colonizers, or recolonizers.

In a previous paper, we reviewed the status of *Parnassia* in the West Gulf Coastal Plain (MacRoberts et al. 1997; see also McDaniel et al. 1997). In this paper, we describe our subsequent observations. The purpose of our recent work was threefold: first, search for additional populations of *P. grandifolia* in Louisiana, second, monitor those populations, and third, compare the ecology and morphology of Louisiana populations to populations elsewhere in the region. We, therefore, surveyed baygalls and bogs in promising habitat in and around our original discovery site. We traveled to Mississippi and Oklahoma to examine *Parnassia* habitat in those places and examined herbarium specimens.

Botanical names follow Kartesz and Meacham (1999) and authorities can be read in that work.

LOUISIANA SURVEYS

We concentrated --- but did not confine --- our surveys to the vicinity of the site of our first discovery of the species on the Winn Ranger District, Kisatchie National Forest, in Natchitoches Parish. The original population (Site A), found on 21 March 1997, is described in MacRoberts et al. 1997. After this discovery, we found two additional sites, both close to the original site.

Site B, found on 26 July 1999, is about 100 meters west of Site A and about 15 meters east of a pitcher plant bog on a hillside just a few meters above a baygall. This population consisted of three small clumps that varied from 40 to 50 leaves in a 1 meter square area between 1999 and 2003. Associated species included *Acer rubrum*, *Athyrium filix-femina*, *Callicarpa americana*, *Cornus florida*, *Dichantherium sphaerocarpon*, *Magnolia virginiana*, *Mitchella repens*, *Morella caroliniensis*, *Nyssa sylvatica*, *Persea palustris*, *Pinus palustris*, *Melanthium virginicum*, *Osmunda cinnamomea*, *O. regalis*, *Rhododendron oblongifolium*, *Sassafras albidum*, *Smilax rotundifolia*, *Woodwardia areolata*, and *Viburnum nudum*.

Site	1997	1998	1999	2000	2001	2002	2003
A	32	72	96	6	24	15	30
B	-	-	1	1	2	0	3
C	-	-	0	0	0	0	0

Table 1. Number of flowering scapes produced by three "populations" of *P. grandifolia* in the Kisatchie National Forest.

Site C, found on 26 March 1999 in a pitcher plant bog, (see MacRoberts et al. 2002 for a description of this bog) consisted of only 22 leaves in a 1 meter square area. This population was about 350 meters west of Site A. In May 2000, it had 29 leaves, but by September 2000, after a severe drought, the site was dry and all above ground vegetation had disappeared. In November 2001, one leaf appeared; it was not found at this location in 2002 or 2003. Associated vegetation included *Acer rubrum*, *Aletris aurea*, *Alnus serrulata*, *Dichantheium* spp., *Eriocaulon decangulare*, *Eupatorium fistulosum*, *Gelsemium sempervirens*, *Helianthus angustifolius*, *Liatris pycnostachya*, *Magnolia virginiana*, *Melanthium virginicum*, *Mitreola sessilifolia*, *Morella caroliniensis*, *Nyssa sylvatica*, *Osmunda regalis*, *Persea palustris*, *Ptilinidium* sp., *Rhododendron oblongifolium*, *Sarracenia alata*, *Scleria ciliata*, *Smilax laurifolia*, *Toxicodendron vernix*, *Viburnum nudum*, and *Viola primulifolia*.

All three sites occur on Betis mildly acidic (4.8-5.4 pH) low-nutrient loamy fine sands on north and west-facing 5-20 degree slopes (Martin et al. 1990). All three sites have between 90% to 100% shrub/canopy cover with filtered light.

We monitored flowering --- which occurs in late October and early November --- between 1997 and 2003 (Table 1). A severe drought in 2000 dried out all sites resulting in the collapse of flowering at Site A. The extent of vegetation, however, was not affected except at Site C as described above.

MISSISSIPPI AND OKLAHOMA POPULATIONS

In order to get a better picture of habitat for this species, we made trips to southern Mississippi on 4 May 1999 and to southern Oklahoma on 26 September 2000 to visit known populations. In Mississippi, *P. grandifolia* grows in three types of pitcher plant bog habitat: seepage bogs, springhead seepages, and muck or quaking bogs (see Eakes 1989; Folkerts 1991). Associates include *Arnoglossum ovatum*, *Chaptalia tomentosa*, *Cyrilla racemiflora*, *Drosera* spp., *Eriocaulon compressum*, *Ilex coriacea*, *Lycopodiella alopecurioides*, *Magnolia virginiana*, *Morella caroliniensis*, *Rhynchospora macra*, *Sabatia macrophylla*, *Sarracenia alata*, *S. psittacina*, *Smilax laurifolia*, *Sphagnum* sp., and *Toxicodendron vernix*. *Parnassia grandifolia* grows in both open areas and in various degrees of shade. Some of the populations we observed were growing in total or near-total sunlight.

There is only one known *P. grandifolia* site in Oklahoma. The plants were first found by Taylor and Taylor (1978) in an "upland marsh" in northern Choctaw Co. We found them growing in full sun at the edge of the marsh in permanently wet mucky soils surrounded by dense marsh vegetation. Associates included: *Boehmeria cylindrica*, *Conoclinium coelestinum*, *Eupatorium perfoliatum*, *Helianthus angustifolius*, *H. grosseserratus*, *H. mollis*, *Helenium autumnale*, *Juncus* sp., *Melanthium virginicum*, *Rudbeckia fulgida*, *R. hirta*, *Saccharum giganteum*, *Salix* sp., *Solidago* sp., *Sorghastrum nutans*, *Typha* sp., and *Woodwardia areolata*.

What was interesting about the Oklahoma population was that not only were they growing in full sunlight, but they were much more robust than other populations we had seen and were in flower in mid-September, fully two months earlier than the Kisatchie National Forest *P. grandifolia* populations. This early blooming was also the case in 1976 when the species was first collected at this site by John Taylor. We measured scape height for comparison with Natchitoches Parish populations. Eight scapes for Oklahoma plants ranged from 35 cm to 60 cm and averaged

49 cm. Fifteen scapes for Kisatchie National Forest plants ranged from 26 cm to 50 cm and averaged 39 cm.

DISCUSSION

Being a disjunct and scattered species in the West Gulf Coastal Plain, *P. grandifolia* presents an interesting subject for biogeographic studies. Do these scattered populations represent remnants of once continuous populations clinging on after the Ice Age or are they recent long distance colonizers or re-colonizers (see map in MacRoberts et al. 1997)? While no one has assessed genetic and morphological variation within and between West Gulf Coastal Plain populations, we noted several striking variations among populations including flowering period, habitat preference, and size of plants. These variations may indicate significant genetic differences evolved in isolation.

Parnassia grandifolia is not the only member of this genus to have disjunct populations in our region: *P. asarifolia* is also disjunct (McDaniel et al. 1997; MacRoberts et al. 1997). Thus, the genus might serve as an interesting subject for genetic study, with the ultimate aim of testing different biogeographic hypotheses as Watson et al. (2002) has recently done for *Eriocaulon koernickianum*. The results of these studies, in turn, would have implications for conservation priorities and for understanding the development of the West Gulf Coastal Plain flora.

ACKNOWLEDGMENTS

The research was supported by National Forest Foundation Cost-share Agreement No. 08-99-06-CCS-008. Steve Leonard and Julia Moore, The Nature Conservancy, Camp Shelby, showed us Mississippi sites. Connie Taylor aided with relocating the Oklahoma site. Jason Singhurst and Eric Keith commented on an earlier version of the paper.

LITERATURE CITED

- Eakes, C.B. 1989. Studies on the life history and habitat of the Bogstar (*Parnassia grandifolia* DC.) in south Mississippi. MS Thesis, University Southern Mississippi, Hattiesburg, Mississippi.

- Folkerts, G.W. 1991. A preliminary classification of pitcher plant habitats in the southeastern United States. *J. Alabama Acad. Sci.* 62:199-224.
- Kartesz, J.T. and C.A. Meacham. 1999. Synthesis of North American Flora. Version 1.0. North Carolina Botanical Garden, Chapel Hill, North Carolina.
- MacRoberts, B.R., M.H. MacRoberts, L.M. Stacey, and D.C. Moore. 1997. The status of *Parnassia* (Saxifragaceae) in the West Gulf Coastal Plain. *Phytologia* 83:53-57.
- MacRoberts, B.R., M.H. MacRoberts, and L.S. Jackson. 2002. Floristics and management of pitcher plant bogs in northern Natchitoches and Winn parishes, Louisiana. *Proc. Louisiana Acad. Sci.* 64:14-21.
- Martin, P.G., C.L. Butler, E. Scott, J.E. Lyles, M. Marino, J. Ragus, P. Mason, and L. Schoelerman. 1990. Soil Survey of Natchitoches Parish, Louisiana. U.S.D.A. Soil Service, Washington, D.C.
- McDaniel, D.L., D.L. Marsh, and W.D. Crank. 1997. Rediscovery of *Parnassia asarifolia* (Parnassiaceae) in Arkansas. *J. Arkansas Acad. of Sci.* 51:208-209.
- Taylor, R.J. and C.E. Taylor. 1978. Additions to the vascular flora of Oklahoma. *Sida* 7:361-368.
- Watson, L.E., A.B. Kornkven, C.R. Miller, J.R. Allison, N.B. McCarty, and M.M. Unwin. 2002. Morphometric and genetic variation in *Eriocaulon koernickianum* Van Heurck & Muller-Argoviensis (Eriocaulaceae): a disjunct plant species of the southeastern United States. *Castanea* 67:416-626.